Simpson

INSTRUMENTS THAT STAY ACCURATE

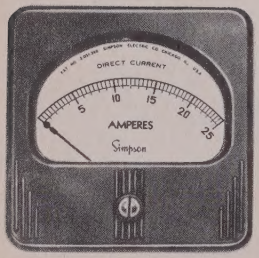
STABRO LABORATORIES, INC.
TECHNICAL REFERENCE LIBRARY
DOCUMENT CONTROL ADMINISTRATOR

# OPERATOR'S MANUAL

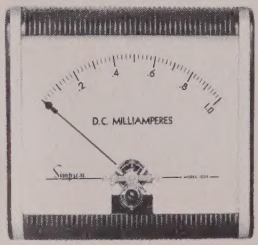
## HORIZONTAL SYSTEM ANALYZER
## MODEL 382

SIMPSON ELECTRIC COMPANY
5200 W. Kinzie St., Chicago 44, Illinois, ES 9-1121
In Canada, Bach-Simpson, Ltd., London, Ontario

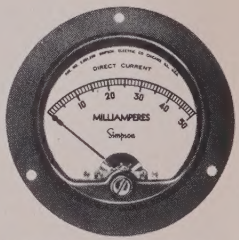
# PANEL METERS by Simpson



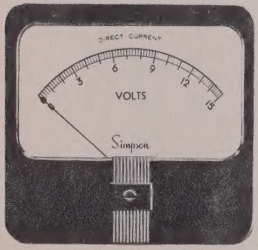

**MODELS 27, 37, 47, 57**
3½" RECTANGULAR
ACCURACY: 2%
SCALE LENGTH: 2-9/16"



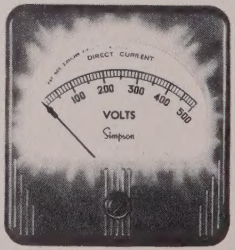

**SIMPSON MODERNISTIC "CLEAR-VUE"**
BUILT TO SPECIAL ORDER
2½", 3½", 4½", 5½" SIZES



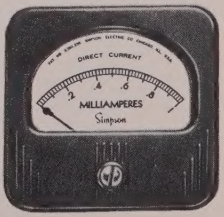

**MODELS 25, 35, 45, 55**
3½" ROUND, ACCURACY 2%
SCALE LENGTH: 1-7/8"
ALSO AS **MODELS 125, 135 145 AND 155** – ALL 2½" ROUND. SCALE 1-7/8"




**MODELS 29, 39, 49, 59**
4½" RECTANGULAR
ACCURACY: 2%
SCALE LENGTH: 3-29/32"




**MODELS 27, 37, 57**
ILLUMINATED
3½" RECTANGULAR
ACCURACY: 2%
SCALE LENGTH: 1-5/16"




**MODELS 127, 137, 147, 157,**
2½" RECTANGULAR
ACCURACY: 2%
SCALE LENGTH: 1-7/8"

NEARLY 800 DIFFERENT SIZES AND KINDS OF SIMPSON PANEL METERS ARE AVAILABLE FROM YOUR ELECTRONIC PARTS JOBBER. WHETHER YOU NEED ONE PANEL METER ..... OR A DOZEN ..... LOOK FOR THE FAMILIAR ORANGE COLORED SIMPSON BOX. FOR FURTHER INFORMATION WRITE SIMPSON ELECTRIC CO., 5200 W. KINZIE ST., CHICAGO 44, ILL., ESTEBROOK 9-1121.

# OPERATOR'S MANUAL

## SIMPSON
## MODEL 382
## TV HORIZONTAL SYSTEM
## IN-CIRCUIT
## ANALYZER
## AND
## CAPACITOR TESTER

**SIMPSON ELECTRIC COMPANY**

5200 W. KINZIE ST., CHICAGO 44, ILLINOIS. EStebrook 9-1121

IN CANADA, BACH-SIMPSON, LTD., LONDON, ONTARIO

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FIGURE 1. SIMPSON MODEL 382 T-V HORIZONTAL SYSTEM IN-CIRCUIT ANALYZER AND CAPACITOR TESTER

## GENERAL DESCRIPTION

The Simpson Model 382 TV Horizontal System In-Circuit Analyzer and Capacitor Tester is a combination instrument which will show the condition of the entire horizontal deflection system, test flyback transformers and horizontal deflection yokes, and measure capacitance through a wide range of values. It has a metal cabinet. All the operating controls, the indicating meter, and a pilot lamp are mounted on the front panel.

### METER

The indicating meter has four arcs. The top three are for capacitance measurements, and the one nearest the bottom is for evaluation of horizontal systems, flyback transformers, and horizontal deflection yokes.

Capacitance values are marked directly on the three capacitance arcs. The top arc is for values from 10 through 1000 micro-microfarads (MMFD). The next arc is for a range from 0 through 0.01 microfarad (MFD). The third capacitance arc is for values from 0 through 0.1 microfarad (MFD).

The inner arc of the meter has a green portion marked GOOD, and a red portion marked REPLACE. These markings show the relative quality for the entire horizontal deflection system, and of the horizontal deflection coils and the flyback transformer. Arbitrary scale divisions marked from 0 through 10 allow a rating comparison between various samples of similar flyback transformers or deflection yokes.

There is an ADJUST mark near the right hand side of the inner meter arc. This is a basic indication to which the pointer should be set to adjust the instrument for power line voltage before each application in tests of the horizontal system or its components.

## FRONT PANEL CONTROLS

There are two switches, a variable control, and a pilot lamp on the front panel. The toggle switch at the upper left will turn the instrument on and off; the pilot lamp will glow to indicate when power is applied to the instrument circuits. The other switch, in the lower right hand corner, selects the function for which the instrument is set, and will also set the range of operation for capacitance measurements. The variable control at the lower left adjusts the power input to compensate for variations of power line voltage.

## TEST LEAD

There is a coaxial test lead which is furnished with the Simpson Model 382 TV Horizontal System In-Circuit Analyzer and Capacitor Tester. It is terminated in a pair of alligator clips, which will be connected to the circuit or component being tested. Use the clip which is connected at the end of the insulated lead as the "hot" lead, and the clip at the end of the shield braid for ground connections.

Be sure to use the test lead which is furnished with the instrument for making all connections; its length, capacitance, and impedance are all calculated into the basic design of the instrument. Any change in the test lead will

reflect errors into the meter indications obtained.

Connect the clip at the end of the shield braid to ground in the circuit under test. Connect the clip at the end of the insulated "hot" lead to the other side of the circuit or component being tested.

## PHYSICAL

The case of the Model 382 measures 7-3/4 by 7-1/2 by 11-1/4 inches. The test lead is 36 inches long. The total weight of the instrument is 8-1/4 lbs. Its shipping weight is 11 lbs.

## ELECTRICAL

The Simpson Model 382 TV Horizontal System In-Circuit Analyzer and Capacitor Tester operates on 105 to 125 volts, single-phase, 50 or 60 cycle A.C. power only. Power consumption is 20 watts.

# TYPES OF TESTS

## HORIZONTAL SYSTEM CHECK

A quick check of the entire horizontal deflection system can be made without disturbing the circuit in the TV receiver. The Model 382, with its function switch set at SHORTS, connects between the plate lead for the horizontal output tube (which is lifted off the plate cap of the tube) and chassis ground. Any deficiency in the flyback transformer, horizontal deflection coil, or width coil will show by dropping the meter pointer into the red REPLACE portion of the scale.

FIGURE 2. TYPICAL CONNECTION POINTS ON FLYBACK TRANSFORMERS

After the first check has shown that there is a fault in the system, short and continuity tests of the components will show which one contains the trouble-making conditions. Of course, a GOOD indication on the meter for this check shows that all three of these components are in satisfactory condition, and no further tests need to be made on them.

When further tests are indicated by the meter in the over-all system check, proceed according to the directions under OPERATION. Use the sequence shown in the instructions.

## SHORTS

When the function switch is set at SHORTS, there is an oscillator which is operating inside the Model 382. The meter on the front panel will show the relative strength of oscillation in the circuit.

Any external connection with the test leads will place the connected item in parallel with the oscillator grid circuit. If the connected item has a high "Q", this connection will not interfere with the operation of the oscillator. But when the connected item has a low "Q", its introduction into the oscillator circuit will reduce the strength of oscillation, and this will reduce meter pointer deflection.

Relative quality, "Q", of a winding in a coil or transformer is a numerical ratio of its inductive reactance to its resistance. As long as the inductive reactance remains large by comparison to the resistance, the winding will have a high Q. If the inductive reactance is reduced, while the resistance remains fairly constant, this lowers the Q.

As little as one shorted turn in a horizontal deflection coil or flyback transformer will decrease the inductive reactance sharply. This will lower the Q of the component and can be identified with the Model 382 SHORTS test.

For the over-all system check, any movement of the meter pointer into the REPLACE portion of the scale shows that there is some fault in the components. This is done with the function switch set at SHORTS, so the oscillator circuit is operating. A REPLACE indication on the meter for this test requires that each component be checked further to determine the exact fault.

When the SHORTS test is applied to the horizontal deflection coil or to the flyback transformer, use the GOOD and REPLACE indications on the meter scale. In general, if the reading is REPLACE, this shows that there are one or more shorted turns in the component. If the reading is GOOD, this eliminates the possibility of its having any shorted turns, but the component could have an open circuit. An open circuit in the windings will not show up as a trouble in the SHORTS test.

## CONTINUITY

After the component has shown GOOD on the SHORTS test, it should be checked for continuity. Set the function switch of the Model 382 at CONTINUITY. The meter will show that there is continuity with the pointer in the GOOD area, or that there is an open circuit with the pointer in the REPLACE area of the scale.

The CONTINUITY test uses an A.C. ohmmeter circuit.

Maximum current through the circuit is 60 microamperes and should not damage any winding across which it is connected.

## DEFLECTION YOKES

One or more shorted turns in the windings of a horizontal deflection coil will be shown in the SHORTS test. The Q of the winding will be decreased enough so that it will lower the strength of oscillation in the Model 382, and the meter pointer will show in the REPLACE portion of the scale.

Some older types of deflection coils were designed with less Q than later types. It is possible to have a lower-than-normal indication when testing the SHORTS of such a coil in satisfactory condition. If there is any doubt, compare the reading from the coil under test with the reading obtained from a known good deflection coil of the same type. Use the scale markings from 0 through 10 to obtain the relative numerical ratings for the coils.

After a deflection coil has been shown as GOOD on the SHORTS test, apply a CONTINUITY test. An open circuit in the deflection coil windings will not show up in the SHORTS test, but will indicate REPLACE for the CONTINUITY test.

## FLYBACK TRANSFORMERS

There may be several separate windings on a flyback transformer. If there is a shorted turn in any winding, this will show REPLACE in the SHORTS test, because a shorted turn in any winding of the transformer will lower the Q in the primary winding, on which the test is made.

For a complete CONTINUITY test, check each winding separately. An open circuit in any one winding will not reflect in the indication for either SHORTS, or for CONTINUITY for another winding.

## CAPACITANCE MEASUREMENTS

The Model 382 has three ranges for capacitance measurements. One is for capacitors with values between 10 and 1000 micro-microfarads (10 - 1000 uuf). The second range is for capacitors up to 0.01 microfarad (0.01 uf, or 10,000 uuf). The third range is for capacitors up to 0.1 microfarad (0.1 uf, or 100,000 uuf).

For each of the three ranges, the instrument operates as an A.C. ohmmeter. The maximum current which will pass through the circuit will be 60 microamperes. A full-wave bridge network rectifies the alternating current to provide meter pointer deflection. More capacity will allow more current to pass through the circuit, and this will increase pointer deflection. Meter indications are marked directly in micro-microfarads, or in microfarads.

# OPERATING INSTRUCTIONS

## PRELIMINARY ADJUSTMENTS

Connect the Simpson Model 382 TV Horizontal System In-Circuit Analyzer and Capacitor Tester to a source of 105 to 125 volt, 50 or 60 cycle, single phase power. Set the power switch at ON and allow a few minutes for the oscillator tube to warm up. The pilot lamp will light to show that power is applied to the instrument.

After a short warm-up time, set the function switch at SHORTS. With the test lead connected to the jack on the front panel of the Model 382, but with its terminal clips not connected, set the ADJUST control, on the front panel, so the meter pointer reads at the adjustment line near the right hand side of the inner arc. The instrument is now ready for use.

WARNING

Always disconnect the TV set from the power line before testing any of its components. Discharge all capacitors in the circuits before you connect the test lead from the Model 382.

## OVERALL HORIZONTAL SYSTEM CHECK

Turn on the power for the Model 382, and adjust it according to the instructions in PRELIMINARY ADJUSTMENTS above. Disconnect the power from the TV set, and discharge all the capacitors in the receiver.

Make an over-all check of the horizontal system, including the flyback transformer, the width coil, and the horizontal deflection coil, as follows:

1. Disconnect the lead from the plate of the horizontal output tube to the flyback transformer. This is a plate cap lead. Just lift the cap off the top of the tube.
2. Connect the hot clip of the Model 382 test cable to the cap lead which was disconnected in step 1 above. Connect the shield wire clip to the receiver ground.
3. Observe the meter on the Model 382. The pointer should

remain in the GOOD segment of the scale. If it indicates GOOD, the horizontal system components are in satisfactory operating condition. However, if the pointer changes its position to REPLACE, one of the three components is defective. To determine the fault, disconnect and test each component separately. Use the sequence shown below.

## TEST THE HORIZONTAL DEFLECTION YOKE

After it has been determined, in the over-all system check above, that there is a fault in the horizontal system, check the deflection coil separately. First test it for shorts; then, if it has no shorted turns, test it for continuity. Use the following procedure:

1. Remove the "hot" lead from the flyback transformer to the horizontal deflection coil.
2. Connect the hot clip of the Model 382 test cable to the lead from the deflection coil. Leave the shield wire clip connected to the receiver ground.
3. Apply the SHORTS test. With the function switch set at SHORTS, the meter pointer will show REPLACE if there are one or more shorted turns in the horizontal deflection coil. If the pointer shows GOOD, there are no shorted turns; next test it for continuity.
4. Apply the CONTINUITY test. Set the function switch at CONTINUITY. Observe the meter. If the pointer indicates REPLACE, there is an open circuit in the horizontal deflection coil. If it shows GOOD, this is the

final check which needs to be made for the deflection coil.

## TESTING FLYBACK TRANSFORMER

After the horizontal deflection coil has been tested and found satisfactory, check the flyback transformer. Leave the "hot" lead disconnected between the flyback transformer and the yoke, and leave the plate cap of the horizontal output tube disconnected.

1. Connect the hot clip of the Model 382 test lead to the horizontal output plate cap lead (same as for the overall system check). Leave the shield wire clip connected to the receiver ground.
2. Set the function switch at SHORTS. The meter pointer will indicate REPLACE if there are one or more shorted turns in the flyback transformer. If the pointer shows GOOD, there are no shorted turns. Test the continuity of each winding separately.
3. Connect the shield wire clip of the Model 382 test lead to the plate cap of the high voltage rectifier tube. Leave the hot clip connected to the plate cap for the horizontal output tube.
4. Set the function switch at CONTINUITY. Observe the meter. If the pointer indicates REPLACE, there is an open circuit in the high voltage portion of the flyback transformer winding. If it indicates GOOD, there is a continuity in this winding.
5. Connect the shield braid clip of the Model 382 test lead

to the B+ lead for the flyback transformer. Leave the hot clip connected to the plate cap lead for the horizontal output tube.

6. Leave the function switch at CONTINUITY. Observe the meter. It will show REPLACE for an open circuit in the flyback primary, or GOOD for a complete circuit.
7. Connect the hot clip of the Model 382 test cable to the flyback transformer terminal from which the deflection yoke lead was disconnected in step 1 under TESTING HORIZONTAL DEFLECTION YOKE. Leave the shield wire clip connected to the B+ lead for the transformer.
8. Leave the function switch at CONTINUITY. Observe the meter. It will show REPLACE for an open circuit in either the transformer secondary winding, or in the width coil, which is in series with it. If the meter shows GOOD, these components are satisfactory.

## MEASURING CAPACITANCE

Be sure the power is off in the receiver in which capacitance measurements are to be made. Discharge all the capacitors before you connect the Model 382 test clips to the capacitor leads.

Connect the Model 382 to a source of 105 to 125 volts, single-phase, 50- or 60-cycle A.C. only. Set the function switch at the desired range and the power switch at ON.

Short the test clips together. Set the ADJUST control on the front panel so the meter pointer reads full scale. The instrument is now ready to use for measuring capacitance.

Measure capacitance as follows:

1. Set the function switch at the desired range position.
2. Disconnect one of the capacitor leads from the circuit.
3. Connect the hot test clip for the Model 382 to the capacitor lead which was disconnected in step 2 above. Connect the shield braid test clip to the other capacitor lead.
4. Read the capacitance directly on the indicating meter. Use the arc on the meter which corresponds to the range selected by the function switch.
5. If the meter reads in the portion between the highest value marked on the scale and the full scale mark to which it was adjusted with the test clips shorted, the capacitance value is higher than the range in use. Set the function switch for the higher range. The maximum capacitance which can be measured with the Model 382 is 0.1 microfarad.

## MAINTENANCE

### OPENING THE CABINET

To open the cabinet for access to the circuit components which are located inside, remove the two screws through the rear of the case. Pull the front panel straight forward: the chassis is attached to it and will come out with the front panel.

When the chassis is removed from the cabinet, all the component parts are exposed, and may be identified with the aid of the over-all schematic diagram, figure 3.

## FUSE

The primary circuit for the power transformer is fused for overload protection. The fuse is a type 3AG with a 1-ampere rating. It is located in a fuseholder mounted on the chassis of the Model 382. In case of a fuse failure, the condition will be indicated by failure of the pilot lamp to light when power is applied to the instrument.

Always replace a blown fuse with another which has the same rating. If a second fuse blows, check into the instrument circuit to locate and correct the fault before you again replace the fuse.

## TUBE

The oscillator tube in the Simpson Model 382 TV Horizontal System In-Circuit Analyzer and Capacitor Tester is a type 6K6GT pentode. It acts as its own rectifier, and is triode connected into the oscillator circuit when the function switch is set at SHORTS. The filament circuit is connected at all times when power is on for the instrument.

Tube failure will be shown on the meter when the pointer can not be set at the ADJUST line on the inner arc, with the function switch set at SHORTS. Note that the test clips must have an open circuit while this adjustment is made with the control on the front panel.

## METER

The meter movement is one of the famous Simpson INSTRUMENTS THAT STAY ACCURATE. It has a sensitivity of 60 microamperes A.C., and is a rectifier type meter.

## BALANCING ADJUSTMENT FOR CAPACITANCE RANGES

Potentiometer R7, located on the chassis, is a screwdriver-adjusted potentiometer. Use it to balance the full scale adjustment for capacitance ranges as follows:

1. Connect power to the instrument and set the function switch at 1000 MMF.
2. Short the test clips together. Adjust the METER ADJUST control for exactly full scale deflection of the meter pointer.
3. Set the function switch at 0.1 MF. Without changing the position of the METER ADJUST control, the meter pointer should still read full scale. If it does not, set potentiometer R7 to correct the condition.

After the potentiometer has been adjusted properly, the meter pointer will read full scale for all three range settings of the function switch without changing the METER ADJUST control on the front panel.

If there is a fault in the meter, do not attempt to repair it. This must be done by trained technicians who have the proper tools. Return the instrument to the nearest official Simpson Repair Station or to the repair department at the Simpson factory in Chicago. Always write a letter to ex-

plain what you think is wrong with the instrument when you send it in for repair. Also indicate whether you wish to have an estimate of charges before work begins, or whether repairs are authorized without an estimate. This will save time and money for both you and the repair department.

## BALANCING ADJUSTMENTS FOR SHORTS TEST

Potentiometer R9, located on the chassis, is a screwdriver adjusted potentiometer used in the adjustment of the shorts test circuit as follows.

Set the FUNCTION switch to the 1000 MMF position and, with the test leads shorted, use the METER ADJUST control to set the meter pointer to the full scale mark on the meter dial. Now, unshort or separate the test leads and set the FUNCTION switch to the SHORTS position. Do not reset the METER ADJUST control. Use potentiometer R9 to calibrate to the ADJUST mark on the dial.

## PARTS LIST

| REF. SYMBOL | DESCRIPTION | SIMPSON PART NO. |
|---|---|---|
| F1 | Fuse, 1-ampere, type 3AG | 1-112507 |
| C1 | Capacitor, 0.001 uf ±20%, 400 WVDC | 1-116253 |
| C2 | Capacitor, 0.003 uf ±20%, 400 WVDC | 1-116252 |
| R1 | Resistor, 5.2 Megohms ±1% | 1-116297 |
| R2 | Resistor, 472.5K, ±1% | 1-116298 |

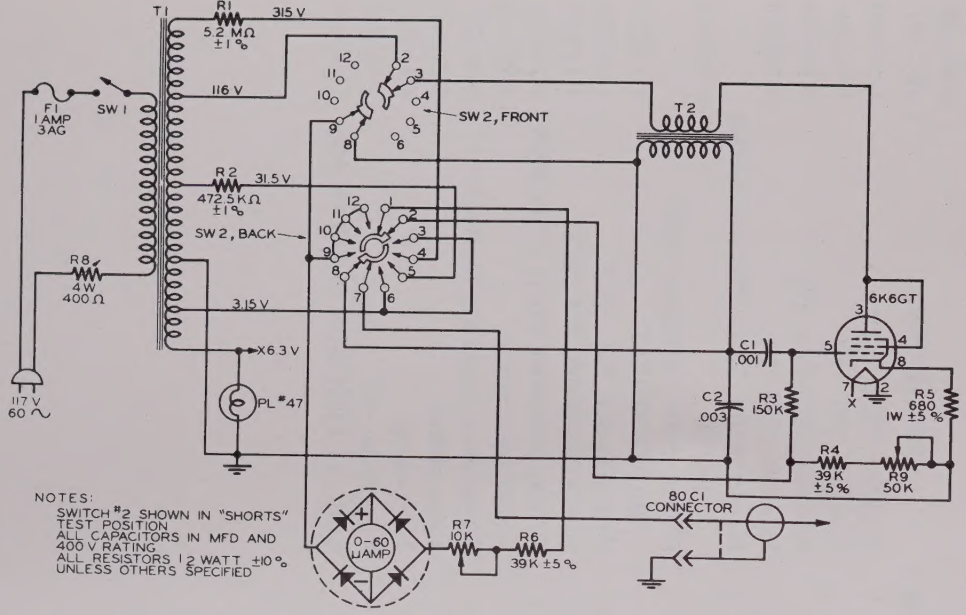


FIGURE 3. OVER-ALL SCHEMATIC DIAGRAM, SIMPSON MODEL 382

| REF. SYMBOL | DESCRIPTION | SIMPSON PART NO. |
|---|---|---|
| R3 | Resistor, 150K, ±10% | 1-113677 |
| R4 | Resistor, 39K, ±5% | 1-111604 |
| R5 | Resistor, 680 ohms, ±5% | 1-113929 |
| R6 | Resistor, 39K, ±5% | 1-111604 |
| R7 | Potentiometer, 10K, ±10%, screwdriver adjusted | 1-116251 |
| R8 | Potentiometer, 400 ohms, ±10%, METER ADJUST | 1-116250 |
| R9 | Potentiometer, 50K, ±30% | 1-116789 |
| SW1 | Switch, power ON-OFF, SPST | 1-115859 |
| SW2 | Switch, 5-position rotary, FUNCTION | 1-116240 |
| T1 | Transformer, power | 10-890278 |
| T2 | Transformer, oscillator feedback | 10-890277 |
| | Tube, 6K6GT | 1-112648 |
| | Tube clamp | 1-116091 |
| | Pilot lamp, #47 | 1-113747 |
| | Knob, for FUNCTION or METER ADJ. | 1-115548 |

Quality is the indispensable component of every Simpson instrument . . . . . .

MP MASTER

MA36046